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5 Takeaways From This Week's Testimony in Landmark Fluoride Trial

The plaintiffs rested their case on Wednesday in the landmark fluoride trial after nearly six days of at times contentious and highly technical testimony that took a deep dive into the science on fluoride's neurotoxic effects. Here are key takeaways.

By Brenda Baletti, Ph.D.

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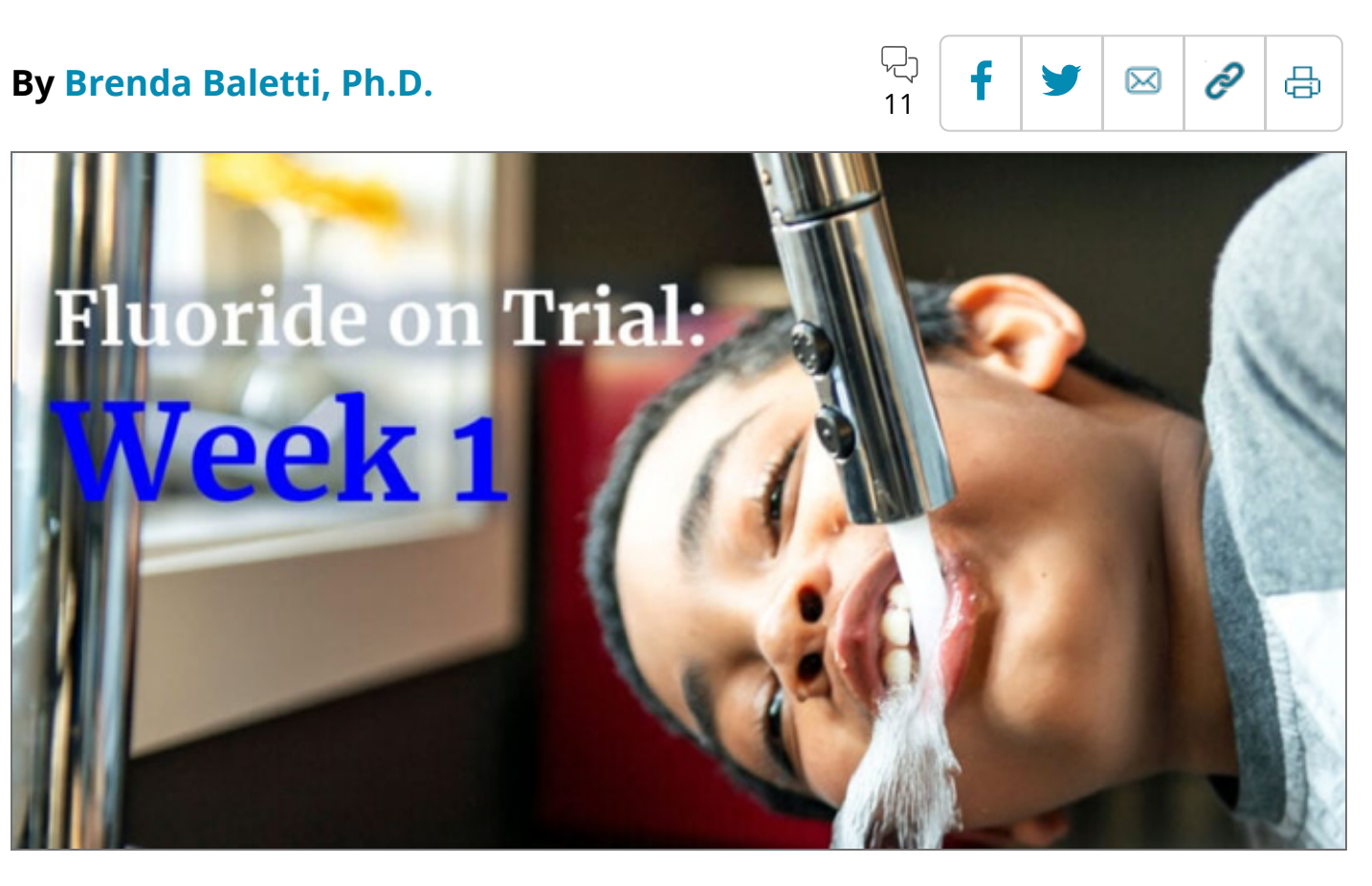

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After nearly six days of sometimes contentious and highly technical testimony that took a deep dive into the science on fluoride's neurotoxic effects, plaintiffs on Wednesday rested their case in a landmark fluoride trial that could end fluoridation of drinking water in the U.S.

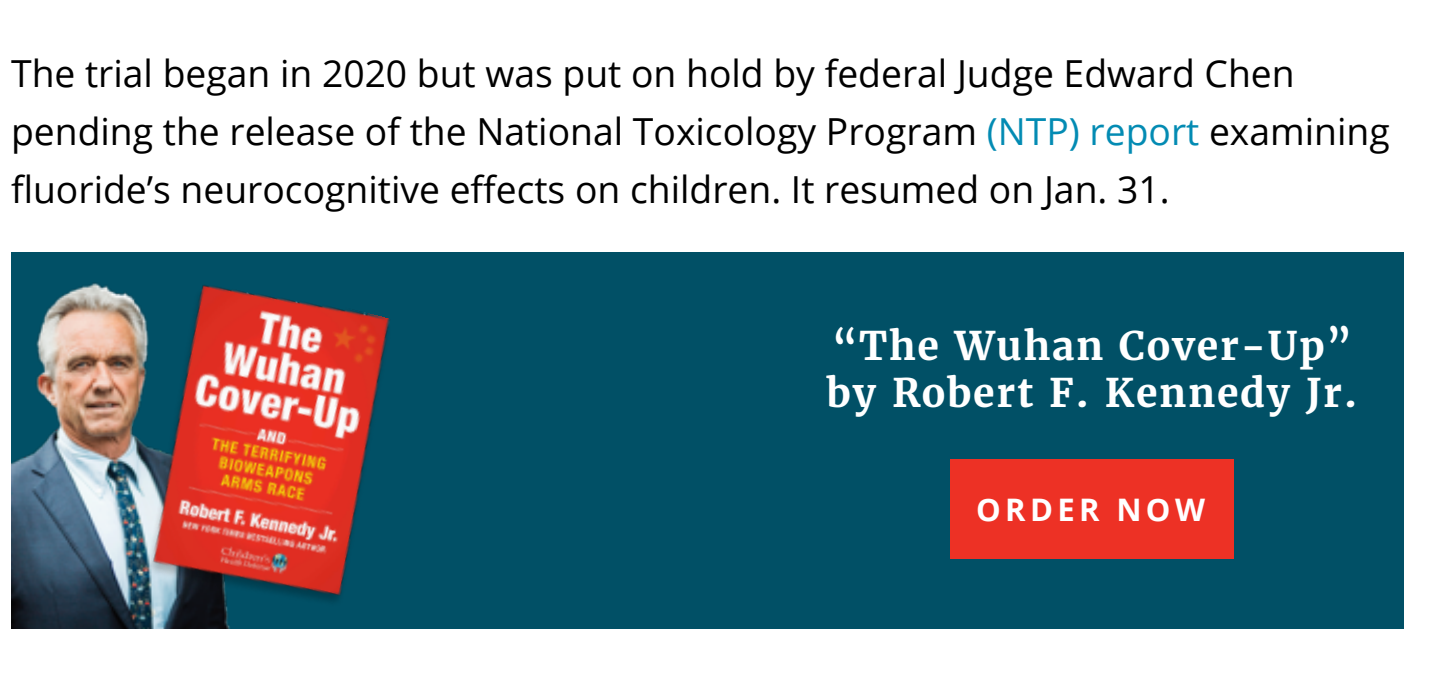
The plaintiffs — Food & Water Watch, Fluoride Action Network (FAN), Moms Against Fluoridation and other advocacy groups and individuals, sued the U.S. Environmental Protection Agency (EPA) in 2017 after the agency denied its petition to end water fluoridation under the Toxic Substances Control Act (TSCA).

Throughout the trial, the two sides clashed over whether water fluoridation in the U.S. ought to be ended based on existing evidence.

The plaintiffs argued that under the TSCA, water fluoridation at current federally recommended levels poses an unreasonable risk to children's developing brains and should not be allowed.

The EPA contended the evidence linking fluoride and lowered IQ in children is too uncertain at existing levels to merit a policy change.

The trial began in 2020 but was put on hold by federal Judge Edward Chen pending the release of the National Toxicology Program (NTP) report examining fluoride's neurocognitive effects on children. It resumed on Jan. 31.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More than 200 million Americans drink fluoridated water. Public health agencies tout water fluoridation as one of the 10 great achievements of the 20th century because of its alleged role in improving dental health.

However, experts have raised concerns about fluoride's toxicity to the federal government at least since 2006, when the National Research Council published a multi-year study on fluoride's toxic effects. And plaintiffs have been organizing for almost ten years to get the EPA to act.

The lawsuit is the first citizen petition under TSCA to make it to a federal courtroom. Under TSCA, the plaintiffs have a right to a "de novo" review, where the court will review all of the scientific evidence with no deference to the EPA's decision.

Chen will determine whether water fluoridation poses an "unreasonable risk" by weighing the science. If Chen finds for the plaintiffs, the EPA will be compelled to limit water fluoridation.

Bloomberg Law predicted the case would open the door to more such petitions.

Plaintiff Brenda Staudenmaier told *The Defender* she is optimistic that the judge will rule in their favor.

"I just worry it's already taken longer than it needed to and a lot of people were not protected," she added.

FAN Executive Director Stuart Cooper told The Defender, "I feel very confident that the judge will rule in our favor, and when that happens, FAN will need support from the public to ensure the removal of fluoridation chemicals from communities as quickly as possible."

Lawyers from the EPA did not respond to The Defender's request for comment.

Five key takeaways from the trial so far:

1. Top experts in chemical toxicity have long had concerns about fluoride

Four experts who testified for the plaintiffs — Dr. Howard Hu, Dr. Bruce Lanphear, Philippe Grandjean, M.D., Ph.D., and Kathleen Theisen, Ph.D. — are top scientists who have worked as advisers to the EPA on understanding and setting hazard levels for other major environmental toxins such as lead, mercury and PFAS (per- and polyfluoroalkyl substances) chemicals.

They have studied fluoride's harmful effects for well over a decade, largely through research funded by the National Institutes of Health (NIH). The evidence linking fluoride to neurotoxicity in children has grown during that time, with new studies published as recently as this week.

Grandjean, adjunct professor in environmental health at Harvard and chair of environmental medicine at the University of Southern Denmark, told the court that research on fluoride's toxicity began with occupational studies by Kaj Roholm in the 1930s.

Those studies, he said, found evidence of skeletal fluorosis and neurotoxicity. Harvard attempted to suppress his own research into fluoride exposure among cryolite mill workers in Copenhagen in the 1930s, he told The Defender.

Research on fluoride's neurotoxicity also has included extensive animal studies. In those studies, Theissen said, fluoride exposure caused tissue damage to animals' brains.

Grandjean and his colleagues' ecological studies linking fluoride exposure from naturally occurring fluoride to cognitive deficits among children in China, along with a systematic review of the existing literature over 10 years ago found a link between fluoride and neurotoxicity.

Thiessen was one of the researchers on the landmark 2006 National Research Council multi-year study that concluded fluoride can adversely affect the brain, elevated fluoride concentrations in drinking water may be of concern for neurotoxic effects and additional research was warranted.

But former NTP Scientific Director Brian Berridge told The Defender a lot of that research that should have been done wasn't, for political reasons.

There are, however, four major fluoride studies using birth cohorts — where researchers collect epidemiological data during pregnancy and then follow children over their lifetimes to study a variety of health outcomes tied to environmental exposures — being presented by both parties as key evidence in this case.

Hu, Lanphear and Grandjean are the principal investigators on three of those studies: the Mexican ELEMENT, the Canadian MIREC and the Danish Odense cohort studies. All three of the experts testified for the plaintiffs that fluoride exposure is associated with lower IQ in children and therefore poses a threat to the developing brain.

Jesús Ibarluzea, Ph.D., the principal investigator of the fourth cohort study — the Spanish INMA, which did not find an association between fluoride and lower IQ — was deposed on behalf of the EPA. Ibarluzea later withdrew from further participation in the trial. The EPA will enter his deposition video into evidence and other experts are testifying about his data.

2. The central question in the trial is whether fluoride poses an 'unreasonable risk'

To determine whether water fluoridation poses an unreasonable risk to public health, the plaintiffs argued the EPA ought to be properly applying its risk assessment framework for existing chemicals.

To do this, according to the EPA's own materials, the agency must determine whether a chemical poses a hazard and at what level. Then it must assess how people are exposed to that hazard. Finally, it has to examine the margin between the hazard level and the exposure level.

That margin of uncertainty — the gap between the level at which a chemical can harm human health and the level at which people can be exposed to it — has to be large enough to account for any scientific unknowns and to protect the most vulnerable populations who may have greater vulnerability than others.

The EPA typically requires a margin of 30 times to determine whether a substance poses a risk. However, margins are higher for some substances. For example, tetrachloroethylene is banned at levels 89 times lower than the hazard level, and methylene chloride exposure is not allowed at levels 27 times lower.

None of the chemicals regulated under TSCA, according to testimony from the EPA's risk assessment scientist, Stanley Barone, Ph.D., have a margin of less than 10.

If the hazard level were set at 1.5 milligrams per liter (mg/L) where the NTP report established with moderate certainty that fluoride affects children's IQ, an exposure level of 0.7 mg/L would mean the margin of uncertainty is much smaller than other TSCA-regulated chemicals.

The plaintiffs also introduced evidence that the hazard level for fluoride is lower than 1.5 mg/L — at or below current levels of water fluoridation of 0.7 mg/L.

Barone, who was called by the plaintiffs to explain the EPA's risk assessment strategies, said the risk assessment process is more complex and that there is not enough data about fluoride's neurotoxicity at lower levels to require a hazard assessment under TSCA.

Barone gave several hours of highly technical testimony over two days, explaining in detail methods that can be used by the EPA to determine hazard, risk, benchmarks and margins of uncertainty. He argued overall that if fluoride were put through a risk assessment protocol, there wouldn't be enough evidence — or the calculations would be too opaque — to classify it as a hazard.

The plaintiffs countered with evidence that the EPA had used less data to classify other chemicals as hazards. Barone conceded that fluoride should not be held to a higher standard than other toxicants.

The EPA's case hinges on the argument that to demonstrate "unreasonable risk," the plaintiffs must offer a preponderance of evidence showing fluoride lowers IQ at the water fluoridation level of 0.7 mg/L.

Plaintiffs contend that an unreasonable risk exists when there is not a sufficient margin between the hazard level and the exposure level and also that evidence shows fluoride is associated with lowered IQ at lower levels as well.

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3. Allegations that political pressure led to suppression of the NTP report were excluded from a trial, but those politics still play a role in interpreting the findings

Michael Connett, the plaintiffs' attorney, asked the witnesses to explain the findings of the NTP's draft report linking fluoride to lower IQ in children.

The report concluded that prenatal and childhood exposure to higher levels of fluoride is associated with decreased IQ in children.

It also found that given that children are exposed to fluoride from multiple sources, there was "no obvious threshold" at which fluoridating water would be safe.

Eighteen of the 19 high-quality studies in the NTP report found an association between higher fluoride levels and lowered IQ in children.

These summary statements were made after the NTP walked back its original assessment classifying fluoride as a hazard, based on reviewer comments from the National Academies of Sciences, Engineering, and Medicine.

The report was subject to an unprecedented amount of review and interagency feedback that included appeals by representatives from the American Dental Association to stop its publication.

Documents released to plaintiffs in response to Freedom of Information Act requests revealed top people at NTP, like Berridge, an expert witness called by plaintiffs, were concerned with industry interference and also that top personnel at the U.S. Department of Health and Human Services intervened to block the report.

Chen, who originally put the trial on hold awaiting the report, ruled the trial could go forward with the draft version of the report. However, he disallowed any further discussion of political attempts to suppress the report so the trial would focus on weighing the science.

Attorneys for the EPA in their cross-examination sought to discredit the report, highlighting the fact that it has gone through multiple reviews and walked back some assessments as evidence of problems with the report, rather than as the outcome of political pressure.

They also tried to discredit the report in Grandjean's cross-examination, asking him to concede that because he disagreed with some of NTP's conclusions, there must be something wrong with the report.

Grandjean told The Defender, "The NTP report was done by excellent scientists and was comprehensive and balanced, except that it slightly underestimated the fluoride risks in the conclusions. Nonetheless, the report has been criticized, unfairly I believe, by some interest groups that favor water fluoridation."

Theissen also testified to the integrity of the report, noting the report did find an association with lower IQ at doses below the recommended water fluoridation level.

Even in places with water fluoridation levels at approximately 0.7 mg/L, according to the NTP, there is evidence the urinary fluoride levels among pregnant mothers exceed the levels at which harm has been observed.

"Neurotoxicity is a hazard of fluoride exposure, the evidence is abundant," she said.

4. There is debate about how to interpret the cohort studies

In the EPA's opening statements and throughout the trial, it has argued that the evidence linking fluoride and lowered IQ at low levels like the 0.7 mg/L at which water is fluoridated, is uncertain.

The ELEMENT cohort fluoride study in Mexico found a statistically significant effect at low levels. The MIREC cohort fluoride study in Canada found a statistically significant effect at low levels only for boys.

The Odense cohort study in Denmark did not find a statistically significant effect at low levels — but researchers did use it in a pooled research study to identify a hazard level for fluoride — and neither did the INMA study in Spain.

As a result, the EPA's attorney claimed there is not enough evidence showing a link.

The plaintiffs' experts, however, argued that even in the cases where there is no statistical significance, the trends in the evidence indicate a link and that epidemiological research is moving toward a more nuanced reading of such results.

Hu also pointed out that in studies with very low levels overall, like the Odense cohort where water was not fluoridated and the levels of fluoride were very low, it is more difficult to tease out the impact of that exposure. Studies like the Danish Odense study can therefore be less accurate, he explained to the court.

Plaintiffs' witnesses also pointed out that different populations have different levels of health and variable outcomes are to be expected.

The study conducted in coastal Spain by Ibarluzea and published in 2022 after the NTP finished its systematic review — which found no statistically significant link between fluoride exposure and lowered IQ in children — is a key piece of evidence for the EPA.

Although that study did not find evidence that fluoride is neurotoxic at low levels, it did find that fluoride increased IQ for boys by 15 points — a finding the plaintiffs' witnesses have called "implausible."

They argue such implausible findings and the failure of the study to control for key variables that can affect results, like fish consumption, place the study's results in question, despite its high-quality design and implementation.

EPA expert witness David Savitz, Ph.D., professor of epidemiology at Brown University and the EPA's first witness, testified Friday morning, countered that it is "unlikely to get diverse results and still believe they are pointing in the same direction."

Savitz agreed that the finding that fluoride increased IQ was implausible and could indicate a problem with the study, but he said that in examining the study, he could not identify the problem. He still argues, however, that the study is credible.

Savitz also couldn't account for the sex differences in all of the studies when asked by the judge, but he said it was just a "fluke."

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5. Susceptible members of the population, like pregnant women and bottle-fed babies, will be particularly vulnerable to fluoride's neurotoxic effects

Part of the reason there must be a margin between hazard and exposure levels for any toxin regulated under TSCA is so the most vulnerable people will be protected and in this case, pregnant women, bottle-fed babies and children generally fall into that group.

Before the trial, attorneys from both sides agree on several "undisputed facts." One of those is that fluoride ingested by a pregnant mother passes through the placenta and is ingested by her baby. Grandjean told the court that the most vulnerable populations to neurotoxicity are pregnant mothers and babies.

Hu testified that in his work on the ELEMENT cohort, they found higher levels of fluoride exposure among pregnant mothers were associated with lower IQ in their children, and that the effects were particularly strong for nonverbal IQ abilities, which are more challenging to correct through therapy and education than verbal abilities.

Lanphear described his work linking water fluoridation to hypothyroidism in pregnant mothers of children with lower IQ scores, which he said may be one of many possible mechanisms by which fluoride impacts fetal brain development.

It is undisputed in the literature that hypothyroidism in mothers causes IQ loss in children, he said, and his research found that pregnant women exposed to higher amounts of fluoride had an increased risk of those women developing hypothyroidism.

Data from the MIREC study also showed that pregnant women in their third trimester living in fluoridated areas have significantly higher levels of fluoride in their urine than other people and women in other trimesters.

The pregnant women in the 95th percentile had levels of 2.41 mg/L, more than double that of pregnant women living in non-fluoridated areas. This is significant because the 95th percentile marks the "most vulnerable" women.

Lanphear said only water fluoridation could account for these high levels.

In his testimony, Lanphear outlined the results in the MIREC cohort that showed that babies fed with formula made with fluoridated water had lower IQs later in life than their breastfed peers.

Thiessen later testified to this same fact. She told the court that 300,000 babies in the U.S. annually consume formula made from fluoridated water.

Lanphear also told the court that Americans living in poor and low-income communities might be more susceptible to fluoride, pointing to studies in Cincinnati and Rochester.

Thiessen also explained to the court that a lot of background fluoridation levels also come from the fact that many processed foods and drinks are made with fluoridated water, so people consuming high levels of processed foods also have higher fluoride exposure.

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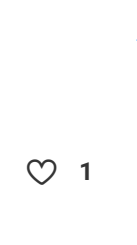

Brenda Baletti, Ph.D.
Brenda Baletti Ph.D. is a reporter for The Defender. She wrote and taught about capitalism and politics for 10 years in the writing program at Duke University. She holds a Ph.D. in human geography from the University of North Carolina at Chapel Hill and a master's from the University of Texas at Austin.

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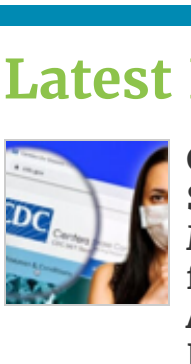
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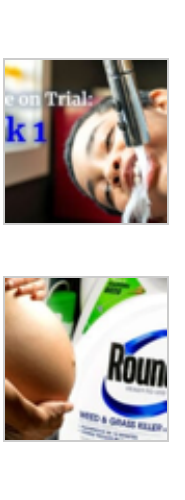
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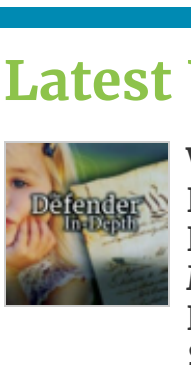
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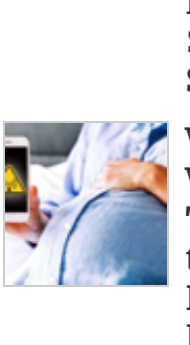
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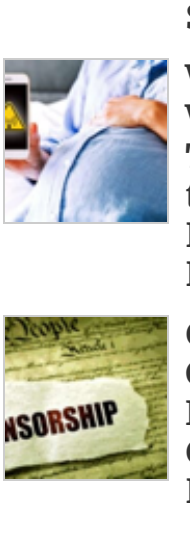
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Blue Skies
2 days ago
All this arguing over whether to continue putting an industrial waste product into the water supply. The EPA is an industry captured agency. Criminals.

If you are so enamored with fluoride by all means ingest it but don't force it upon people who don't want this poison in their drinking water.

19 0 Reply • Share ›

Judith Smith → Blue Skies
2 days ago
Your correct identification of " an industrial waste product" says it all. And the EPA thinks it's ok to ingest! I find great wisdom in common men and women, like us, who see the wrong and know what to do and great stupidity in many who have a voice in things that matter. Sadly, there must be evil involved in these matters.

3 0 Reply • Share ›

Jeremy Beckman → Blue Skies
2 days ago
As a poor kid growing up I was forced to drink our tap water which had a slight taste and smell, and I didn't like to drink it as a result. My wealthier classmate had a reverse osmosis unit in their kitchen and I remember drinking it and being wowed by how much better it tasted (no taste!). Who knows how much my intellect was poisoned and stifled just by the tap water? Now I drink reverse osmosis or distilled water... No taste no smell no chemicals.

2 0 Reply • Share ›

David Goldstein
2 days ago
We need to examine why was the active ingredient in Sarin nerve gas , rat poison , roach pesticides --basically dilute nerve gas !, and prozac is being added to tap water in the first place ... At Nuremberg the nazis admitted to the court that the towns in Germany whose wells they spiked had the lowest resistance to the regime !!! F also displaces meager iodine reserves , turning depletion into starvation , as well as destroying 66 out of 85 of our digestive enzymes , HOW CAN A COMPOUND THAT THINS BONES , AT THE SAME TIME HARDEN TEETH ???

9 0 Reply • Share ›

Christine Jahnig
2 days ago
"The EPA contended the evidence linking fluoride and lowered IQ in children is too uncertain at existing levels to merit a policy change." Has anyone at the EPA ever heard the saying "Better safe than sorry."? Does anyone at the EPA believe our children are more important than the EPA standing up for its own decisions? I doubt it.

5 0 Reply • Share ›

Nod → Christine Jahnig
2 days ago
also knowns as the "precautionary principle". Many people have cancer because of fluoride. The head of the agency shoudl be jailed for LIFE.

1 0 Reply • Share ›

Susan Gonzalez
2 days ago
The fluoride used to fluoridate water supplies is an industrial waste product. It's a toxic industrial waste product. I'm just curious why that important fact wasn't mentioned or included as part of the argument against fluoridating water?

2 0 Reply • Share ›

Nod
2 days ago
Not all of the EPA are captured. As the globalist learned a long time ago, all you have to do is own the top dogs of any agency, and you own the agency.

"The following documents why our union, formerly National Federation of Federal Employees Local 2050 and since April 1998 Chapter 280 of the National Treasury Employees Union, took the stand it did opposing fluoridation of drinking water supplies. Our union is comprised of and represents the approximately 1500 scientists, lawyers, engineers and other professional employees at EPA Headquarters here in Washington, D.C.

The union first became interested in this issue rather by accident. Like most Americans, including many physicians and dentists, most of our members had thought that fluoride's only effects were beneficial – reductions in tooth decay, etc. We too believed assurances of safety and effectiveness of water fluoridation. For a history of how drinking water fluoridation began, see "Fluoride, Teeth and the Atomic Bomb", by investigative reporters Joel Griffiths and Chris Bryson.

Then, as EPA was engaged in revising its drinking water standard for fluoride in 1985, an employee came to the union with a complaint: he said he was being forced to write into the regulation a statement to the effect that EPA thought it was alright for children to have

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BraveNewWhirled
a day ago
I don't know about you folks but I grew weary of the lies and obfuscation around certain subjects, including this one. To view the intense propaganda from the 1940's shows us this is not a new thing: The government and industry has lied to us for many decades. They care not one bit about our well-being, and is it up to each of us to be informed and protect ourselves and loved one.

It is reprehensible that most of our major cities force-medicate the population. It's even more disgusting that baby formula consisting of GMO estrogen mimickers and sugars can also be made with extra fluoride. YAY Mom! No cavities!

1 0 Reply • Share ›

Tim McCormack
a day ago
Is there a single valid study that shows that fluoride provides ANY benefit??? I think FOIA requests have not produced any.

0 0 Reply • Share ›

Jennifer Collins Brever
2 days ago
This is a semi related side note.
I've read reports by Ana Maria Mihalcea, MD, PhD that within dental pain relieving injections sometimes given when having dental work is undeclared nanotechnology.
Great to finally legally challenge and reveal the fluoride crime to the public. Long time coming.

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